

**AMENDMENT TO THE CLAIMS**

This listing of claims will replace all prior versions, and listings, of claims in the application.

**Listing of Claims:**

1. (Currently amended) A kit comprising a PCR (polymerase chain reaction) device and a sol-gel material for use in the PCR device, wherein the PCR device comprises comprising:

an inlet through which a biochemical fluid is injected;  
an outlet through which the biochemical fluid is discharged;  
a PCR channel positioned between the inlet and the outlet;  
a heat source for operating the PCR device; and

first and second micro-valves which is formed as channel for containing a sol-gel transformable material, wherein the first and second micro-valves control opening and closing of the inlet and the outlet, and intersect portions of the PCR channel near the inlet and the outlet of the PCR device, respectively;

wherein the PCR channel extends in a first direction on a plane and the first and second micro-valves extend in a second direction on the plane of the PCR channel, the first direction and the second direction being perpendicular to each other,

wherein the sol-gel material is for use in the first and second micro-valves; wherein the sol-gel transformable material transforms from a sol state into a gel state at a temperature lower than DNA denaturation temperature, annealing temperature and extension temperature and higher than room temperature, as the temperature increases to operate the PCR by the heat source; and is operative to control the opening and closing of the first and second micro-valves; wherein an additional heat source for controlling the temperature of the sol-gel transformable material is absent from the PCR device; and wherein an additional valve means for the inlet and the outlet other than the first and second micro-valves is absent.

2. (Previously Presented) The PCR device of claim 1, wherein the sol-gel transformable material is a methyl cellulose solution.

3. (Withdrawn) The PCR-devicee-kit of claim 1, wherein the first and second micro-valves form the inlet and outlet of the PCR device, respectively.

4. (Withdrawn) The PCR device of claim 1, wherein the first micro-valve extends in a direction in which the biochemical fluid is injected into the inlet, and the second micro-valve extends in a direction in which the biochemical fluid is discharged through the outlet.

5. (Withdrawn) The PCR device of claim 1, wherein the first and second micro-valves are interconnected with the inlet and the outlet, respectively, the first micro-valve branches off from a portion of the PCR channel near the inlet in a different direction from a direction in which the biochemical fluid is injected, and the second micro-valve branches off from a portion of the PCR channel near the outlet in a different direction from a direction in which the biochemical fluid is discharged.

6. (Cancelled)

7. (Withdrawn) The PCR device of claim 6, wherein one end of the first micro-valve is connected to one end of the second micro-valve.

8. (Withdrawn) The PCR device of claim 1, wherein the first and second micro-valves intersect portions of PCR channels of a plurality of PCR devices near inlets and outlets of the PCR devices, respectively.

9. (Withdrawn) The PCR device of claim 8, wherein one end of the first micro-valve is connected to one end of the second micro-valve.

10. (Withdrawn) A method of regulating opening and closing of an inlet and an outlet of a PCR device, the method comprising:

connecting micro-valves, each of which contains a sol-gel transformable material that transforms from a sol state to a gel state at a temperature lower than DNA denaturation

temperature, annealing temperature and extension temperature regarding PCR and higher than room temperature, to the inlet and the outlet of the PCR device; and

inducing a sol-to-gel transformation in the micro-valves using temperature variations in a thermal cycle of PCR.

11. (Withdrawn) The method of claim 10, wherein the sol-gel transformable material is methyl cellulose.

12. (Withdrawn) The PCR device of claim 2, wherein the first and second micro-valves form the inlet and outlet of the PCR device, respectively.

13. (Withdrawn) The PCR device of claim 2, wherein the first micro-valve extends in a direction in which the biochemical fluid is injected into the inlet, and the second micro-valve extends in a direction in which the biochemical fluid is discharged through the outlet.

14. (Withdrawn) The PCR device of claim 2, wherein the first and second micro-valves are interconnected with the inlet and the outlet, respectively, the first micro-valve branches off from a portion of the PCR channel near the inlet in a different direction from a direction in which the biochemical fluid is injected, and the second micro-valve branches off from a portion of the PCR channel near the outlet in a different direction from a direction in which the biochemical fluid is discharged.

15. (Cancelled)

16. (Withdrawn) The PCR device of claim 2, wherein the first and second micro-valves intersect portions of PCR channels of a plurality of PCR devices near inlets and outlets of the PCR devices, respectively.

17. (Currently amended) The ~~PCR-device~~kit of claim 1, wherein the sol-gel transformable material transforms from a gel state into a sol state at a temperature lower than DNA denaturation temperature, annealing temperature and extension temperature and higher than room temperature, as the temperature decreases after the PCR is terminated.

18. (Currently amended) The ~~PCR-device~~kit of claim 2, wherein the concentration of the methyl cellulose solution is 2w% or less.

19. (Currently amended) The ~~PCR-device~~kit of claim 2, wherein the concentration of the methyl cellulose solution is 0.5w% or less.